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10/682,454	10/10/2003	Soichiro Kawakami	00839.000469	9812

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EXAMINER
TIBBITS, PIA FLORENCE

ART UNIT	PAPER NUMBER
2838	

DATE MAILED: 03/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/682,454	**Applicant(s)** KAWAKAMI ET AL.
	Examiner Pia F. Tibbits	**Art Unit** 2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29 and 31-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,7,11,18,22-29 and 31* is/are rejected.

7)☒ Claim(s) *4-6,8-10 and 19-21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 October 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/14/2005*.

4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *2/24/2006* .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

This Office action vacates the previous Office action, and is in answer to the amendment filed 10/14/2005. Claims 1-29, 31-33 are pending, of which claims 1-19, 21-23, 25, 28, 29 are amended, and claims 31-33 are added.

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the portable instruments including cellular phones, personal digital assistants, and portable type computers (claim 31), the movable bodies including motorcycles, automobiles, ships, aircrafts, and space crafts (claim 31) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter: "without a resistor being connected to the rechargeable battery" (claims 32 and 33). See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction is required.

Claim Objections

3. Claims 1, 22 are objected to because of the following informalities: ----previously acquired data are--- to replace "previously acquired data is". Appropriate correction is required.

4. Claims 12 is objected to because of the following informalities: the recitation "an average discharging voltage of said normal rechargeable battery when it is discharged at a discharging current value i is made to be $V_{m'}$" is duplicated. Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3, 7, 11, 18, 22-29, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over prior art disclosed by applicant, **Joo** [5175485] in view of prior art disclosed by applicant, **Gaza** [5998966].

As to claim 1, Joo discloses in figures 1-5 a detecting apparatus for detecting internal resistance of an inspective rechargeable battery when said inspective rechargeable battery is charged by a constant current-constant voltage charging regime comprising a constant current charging mode and a constant voltage charging mode in that charging is commenced by said constant current charging mode at a constant current value I_0 and after the battery voltage reaches a given voltage value V_{max}, the charging is performed by said constant voltage charging mode at a constant voltage V_{max} until the termination thereof, said detecting apparatus comprising: (a) means for obtaining an accumulated, charged electricity quantity of said inspective rechargeable battery in said constant voltage charging mode/measuring a voltage of said inspective rechargeable battery 9 [see fig.3; abstract; column 4, lines 15-17, 27-29]; wherein the relationships are between charged electricity quantities Q_{cv} of said normal rechargeable battery and increased or decreased internal resistances of said normal rechargeable battery between said charged electricity quantities Q_{cv} and increased or decreased magnitudes of said internal resistances [see column 6, lines 51-55]. Joo does not disclose means for memorizing previously acquired data of a normal rechargeable battery in said constant voltage charging mode, and means for comparing.

Gaza discloses in figures 1-15 a detecting apparatus including means for memorizing EEPROM 32 previously acquired data of a normal rechargeable battery in said constant voltage charging mode [see column 4, lines 54-57; column 8, lines 16-18, 45-52, 58-67]; and means for comparing microcontroller 30 said charged electricity quantity obtained by said means to inspective rechargeable battery in the constant voltage charging mode to said previously acquired data memorized by the means for memorizing. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Joo's apparatus and include means for memorizing previously acquired data of a normal rechargeable battery, and means for comparing said charged electricity quantity to inspective rechargeable battery in the constant voltage charging mode, as disclosed by Gaza, in order to update previously acquired data with respect to relationships between charged electricity quantities of said normal rechargeable battery and increased or decreased internal resistances of said normal rechargeable battery or increased or decreased magnitudes of said internal resistances and avoid a temperature-dependent irreversible deterioration of the battery.

As to claims 3, 18, 23, Joo discloses timing means 13 [see fig.3]. With respect to the recitation wherein in a case where said inspective rechargeable battery has an electricity storable capacity which is reduced to a magnitude of D time that of said normal rechargeable battery, where D is a constant of $0<D<1$, said detecting apparatus has a further means for correcting said charged electricity quantity by multiplying said charged electricity quantity by 1/D time prior to comparison by said means (iv): one skilled in the art would be able to program the microcontroller 30 to reduce to a magnitude of D time the electricity storable capacity of said normal rechargeable battery since it is very well known in the art to define a particular process by performing routine derivations of very well known equations.

As to claim 2, 22, 24-28, 31, see remarks and references above.

As to claim 11, wherein a time point when said charged electricity quantity of said inspective rechargeable battery in said constant voltage charging mode is measured is any of the following three time points: (1) a time point when the charging current in the constant voltage charging mode is sufficiently-decreased to a prescribed current value (I_{min}), (2) a time point when a prescribed time (t_n) elapses since the time when the charging current value in said constant voltage charging mode reaches a prescribed current value (I_n), and (3) a timepoint when a prescribed time (t_f) elapses since the time when the constant current charging mode is shifted to the constant voltage charging mode: it would have been obvious to a person having ordinary skill in the art at the time the invention was made to provide a selection for the time point when said charged electricity quantity of said inspective rechargeable battery in said constant voltage charging mode is measured, since it has been held that discovering an "optimum" or "preferred" value for a result effective variable involves only routine skill in the art. ***In re Boesch***, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

As to claim 29, Gaza discloses a computer-executable program, the program being stored on a computer-readable medium/on-board RAM, and on-board EEPROM for program instructions [see column 4, lines 56-57]. With regard to the program detecting internal resistance of an inspective rechargeable battery, and a method therefore, Joo discloses the amount of current flowing through the point "K" is reduced in the constant voltage charging of the storage battery 8 since the internal resistance of the storage battery 8 increases as the storage battery 8 is charged [see column 6, lines 51-55]. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Joo's apparatus and include a computer-executable program, the program being stored on a computer-readable medium, as disclosed by Gaza, in order to track the increase of the internal resistance of the storage battery as the storage battery is charged, and avoid irreversible deterioration of the battery.

As to the method claims 1, 2, 7: the method steps will be met during the normal operation of the apparatus described above.

Allowable Subject Matter

7. Claims 4-6, 19-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claims 4-6, 19-21: none of the references of record prior to applicant's filing date discloses, teaches, or suggests a detecting method for detecting internal resistance of an inspective rechargeable battery when said inspective rechargeable battery is charged by a constant current-constant voltage charging regime comprising a constant current charging mode and a constant voltage charging mode in that charging is commenced by said constant current charging mode at a constant current value I_0 and after the battery voltage of said inspective rechargeable battery reaches a given voltage value V_{max}, the charging is performed by said constant voltage charging mode at a constant voltage V_{max} until the termination thereof comprising, *inter alia*, the step of wherein in a case where it is presumed that said electricity storable capacity of said inspective rechargeable battery is reduced to a magnitude of D time that of said normal rechargeable battery, when a duration from a shift time when said constant current charging mode at said constant current value I_0 is shifted to said constant voltage charging mode at a constant voltage V_{max} until a time when the charging current value in said constant voltage charging mode reaches a prescribed current value I_M and an electricity quantity charged in said constant voltage charging mode are made to be respectively $t_{M'}$ and Qcv' for said inspective rechargeable battery and t_M and Q_{cv} for said normal rechargeable battery, in accordance with a function formula $D=(Q_{cv'}-I_0 X t_{M'}) / (Q_{cv}-I_0 X t_M)$, the said electricity storable capacity of said inspective rechargeable battery is estimated to be D time that of said normal rechargeable battery.

8. Claims 8-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claims 8-10: none of the references of record prior to applicant's filing date discloses, teaches, or suggests a detecting method for detecting internal resistance of an inspective rechargeable battery when said inspective rechargeable battery is charged by a constant current-constant voltage charging regime comprising a constant current charging mode and a constant voltage charging mode in that charging is commenced by said constant current charging mode at a constant current value I_0 and after the battery voltage of said inspective rechargeable battery reaches a given voltage value V_{max}, the charging is performed by said constant voltage charging mode at a constant voltage V_{max} until the termination thereof comprising, *inter alia*, the step of wherein said previously acquired data of said normal rechargeable battery includes data of relationships between said charged electricity quantities Q_{cv} of said normal rechargeable battery and resistance values r_s based on resistors or includes data of relationships between said charged electricity quantities Q_{cv} and internal resistance values (R_1+r_s) of said normal rechargeable battery, wherein said data of relationships between said charged electricity quantities Q_{cv} and said internal resistance values (R_1+r_s) is obtained by a method wherein each of a plurality of resistors each having a different resistance value (r_s) is separately connected to said normal rechargeable battery in series connection to artificially increase an internal resistance value (R_1) of said normal rechargeable battery to a resistance value (R_1+r_s) as an artificially internal resistance value, and wherein in each case, where one of said plurality of resistors is connected to said normal rechargeable battery is charged by said constant current-constant voltage charging regime comprising said constant current charging mode and said constant voltage charging mode in that charging is commenced by said constant current charging mode at said constant current value I_0 and after the battery voltage of said normal rechargeable battery reaches said given voltage value V_{max}, the charging is performed by said constant voltage charging mode at said constant voltage V_{max} until the termination thereof, and wherein in each case, where one of said plurality of resistors is connected to said normal rechargeable battery, a charged electricity quantity Q_{cv} of said normal rechargeable battery is measured and a relationship between said charged electricity quantity Q_{cv} and said artificially internal resistance value of said normal rechargeable battery is obtained.

9. Claims 12-17, 32, 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claims 12-17, 32, 33: none of the references of record prior to applicant's filing date discloses, teaches, or suggests a detecting method for detecting internal resistance of an inspective rechargeable battery when said inspective rechargeable battery is charged by a constant current-constant voltage charging regime comprising a constant current charging mode and a constant voltage charging mode in that charging is commenced by said constant current charging mode at a constant current value I_0 and after the battery voltage of said inspective rechargeable battery reaches a given voltage value V_{max}, the charging is performed by said constant voltage charging mode at a constant voltage V_{max} until the termination thereof comprising, *inter alia*, the step of wherein after said internal resistance of said inspective rechargeable battery is predicted to be R on the basis of said previously acquired data it is presumed that a total discharged electricity quantity C_d of said normal rechargeable battery whose internal resistance is R_1 is expressed by $C_d=C_N \text{ X } f_{T,I} (R_1)$ from an electricity storable capacity C_N of said normal rechargeable battery and a correction coefficient $f_{T,I} (R_1)$ for a discharged electricity quantity of said normal rechargeable battery which is determined by said internal resistance R_1 at a battery temperature T and a discharging current I, and wherein in a case where electricity storable capacity is not reduced in said inspective rechargeable battery, a total discharged electricity quantity $C_{d'}$ of said inspective rechargeable battery is expressed by $C_{d'}=C_N \text{ X } f_{T,I} (R_1)$ from said electricity storable capacity C_N of said normal rechargeable battery and a correction coefficient $f_{T,I} (R_1)$ for a discharged electricity quantity of said normal rechargeable battery which is determined by said internal resistance R_1 at a battery temperature T and a discharging current I, with said internal resistance R being computed by artificially increasing R_1 by a magnitude of r_s, and wherein when for an instrument in which said inspective rechargeable battery is used as a power source, an average consumption electric current is made to be I, an average consumption power is made to be p, an average discharging voltage of said normal rechargeable battery when it is discharged at a discharging current value i is made to be $V_{m'}$; and a time h during which said instrument is capable of being operated is computed in accordance with an equation $h=C_{d'}/i$ or $h=(V_{m'} \text{ X } C_{d'})/p$, where $V_{m'}=V_m-i \text{ X } (R-R_1) =V_m-i \text{ X } r_S$.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in PTO-892 and not mentioned above disclose related apparatus.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Pia Tibbits whose telephone number is 571-272-2086. If unavailable, contact the Supervisory Patent Examiner Karl Easthom whose telephone number is 571-272-1989. The Technology Center Fax number is 571-273-8300.

14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PFT
November 21, 2005

Pia Tibbits
Primary Patent Examiner